Liver abscesses: causes and prevalence

Liver abscesses are lesions found within the liver. These lesions are scattered throughout the liver and vary in size and number. A typical liver will have between two and ten abscesses, ranging in size from less than one inch to more than six inches in diameter. While the lesions are distributed throughout the liver, larger abscesses tend to be located close to the portal entry.1

Because cattle with liver abscesses often do not show any clinical signs, abscesses are not detected until harvest.2 Though extremely rare, a rupture or perforation can lead to massive infection of other organs and eventually death.2 In most cases, animals will not show specific clinical signs. However, reduced feed intake, reduced weight gain and decreased feed efficiency are all results of liver abscesses.2

Incidence factors and management impacts

Liver abscesses result from the entry, growth and establishment of pyogenic bacteria. Bacteria enter the liver through the portal vein, the hepatic artery, the umbilical vein (only in newborns), the bile duct or by an infection.

In feedlot cattle, entry via portal vein is by far the most common route due to the large volume of blood flow and the proximity to the gastrointestinal tract, a major source of bacteria.3 Liver abscesses can occur at all ages and in all types of cattle, including dairy cows.2

Factors affecting the incidence of liver abscesses:
- Days on feed (DOF)
- Roughage level in the diet
- Grain type (barley or wheat, corn, sorghum)
- Duration of grain feeding
- Feed additives
- Bunk management practices
- Steers vs. heifers
- Seasonal and weather conditions
- Geography

Liver abscess classification

Abscesses are scored 0, A or A+. Livers are removed at harvest and evaluated for abscess size and number. Livers exhibiting the most severe abscesses are graded A+. Livers with fewer, smaller and inactive abscesses are graded A.

- 0: no abscesses
- A: one or two small, unorganized abscesses, or two to four well-organized abscesses, or abscess scars
- A+: one or more large or multiple small, active abscesses
Studies have shown that the primary bacterium causing liver abscesses is *Fusobacterium necrophorum*, previously named *Sphaerophorus necrophorus*. In addition to liver abscesses, *Fusobacterium* is associated with necrotic laryngitis (calf diphtheria), foot rot and foot abscesses in cattle. The rumen is a natural environment for the pathogen and can be found not only in ingested contents, but in the bacterial flora of the ruminal wall. The second most frequent pathogen isolated from liver abscesses is *Arcanobacterium pyogenes*, previously called *Actinomyces* or *Corynebacterium pyogenes*.

Liver abscesses are secondary to acidosis and rumenitis in the rumen. There has been a correlation shown with rumenitis from acidosis as an influencing factor for liver abscesses. This means feeding practices or inconsistent bunk management may prompt acidosis and rumenitis and eventually lead to a higher incidence of liver abscesses. Rapidly increasing dietary energy through high-grain feeding, low-roughage diets, and poor bunk management through irregular feeding (including feed amounts and feed timing) are all directly linked to higher abscess prevalence. Once acidosis has occurred and damaged the rumen wall, the animal becomes more susceptible to pathogenic colonies.

Inclusion of roughage can decrease day-to-day variation in feed intakes, thereby lowering the occurrence of acidosis and rumenitis, although not all studies have shown prevalence tied directly to roughage levels. Grains and grain processing that have, or result in, high rates of starch fermentation, promote greater fluctuations in rumen pH and intake, leading to acidosis, rumenitis and, consequently, liver abscesses. Examples of these feed types include wheat, barley and high-moisture or steam-flaked corn.

The prevalence of liver abscesses is approximately 1% to 3% higher in feedlot steers than heifers, and Holsteins have a greater incidence than beef breeds. This is believed to be based on feed intake. Steers generally consume more dry matter than heifers, and heifers generally mature and finish earlier than comparable weight steers, while Holsteins are typically on feed much longer, with higher total feed intake. Liver abscess incidence can be increased by seasonality and weather, including heat stress, mud and cold, with the highest incidence occurring in spring-harvested cattle.

Bunk management, including adding feed additives to assist in intake variation and feed efficiency in high-concentrate diets, can be an effective tool in limiting acidosis and therefore liver abscesses. Cattle fed Tylan®, an Elanco feed additive, have shown a 72.5% reduction in total liver abscesses, while gaining 2.3% faster and converting feed-to-gain 2.4% more efficiently than cattle not fed Tylan. Tylan’s mode of action has an inhibitory effect on *F. necrophorum*, primarily in the rumen. When included in the bunk, Tylan prevents the increase in ruminal populations of *F. necrophorum* typically associated with high-grain diets.
As noted in the section on incidence factors, basic cattle biology affects the prevalence of abscesses. The cattle’s sex and feeding patterns will greatly impact the prevalence level. As a group, these key areas have shown the largest correlation with prevalence.

Abscess prevalence varies based on:
• Cattle sex (steers or heifers)
• Cattle type
• Feeding behavior
• Maturity
• Retained as replacements

Industry trends have shown that liver abscesses develop throughout a calf’s life; however, lower incidence levels are observed early in the feeding period, with abscesses resolving in less than 60 days. In the final 60 days of the feeding period, a higher incidence of abscess development has been seen. While animal maturity is a factor affecting prevalence, especially when considering days on feed, abscesses can form any time after a bout of acidosis causing rumenitis and *F. necrophorum* bloom.2

### Economic impact

It’s not just a packer issue — liver abscesses reduce feedlot cattle performance. Abscesses are the leading cause of liver condemnation in the United States. While the liver itself is not a significant financial loss to a producer, reduced animal performance and carcass yield have a large economic impact. Cattle with abscessed livers have reduced feed intake, reduced weight gain and decreased feed efficiency, leading to a reduced carcass dressing percentage. Most often, these effects are evident in cattle with the most severe abscesses.6

Cattle with severe liver abscesses have significantly lower live weight, carcass weight and dressing percentage, as well as higher carcass trim. Additional carcass trimming, due to abscess adhesion to the diaphragm and surrounding organs, may be required. In some instances, condemnation of the entire viscera may be necessary. Accidental rupture of an abscess and carcass contamination can interrupt carcass flow, costing time and labor.6

For more information on management practices and Tylan, please contact your Elanco sales representative. For industry data trends on liver abscesses, visit www.elanco.us.

### Liver abscess prevalence in feedlot cattle:
- Ranges from 1% to 2% to as high as 90% to 95%

### Typical feedlot prevalence:
- Between 12% and 32%

### Liver abscess prevalence averages for Tylan-fed cattle:
- Steers 12% – 15%
- Heifers 10% – 13%
- Holsteins 14% – 30%
- (Range: 0% – 95%)

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**Figure 4**: 10-year average of liver abscesses in Elanco-checked cattle (2003 – 2013)

**Figure 5**: Carcass characteristics of commercially-fed cattle, grouped by liver abscess score

Holsteins have a greater prevalence because they are normally on feed much longer and generally have higher total feed intake than beef steers (an average of 12% higher).2
The label contains complete use information, including cautions and warnings. Always read, understand and follow the label and use directions.

**Tylan**

For reduction of incidence of liver abscesses: Feed continuously at 8 to 10 g/ton of tylosin (90% DM basis) to provide 60 to 90 mg/hd/d.